

ANNOTATED CHECKLIST OF ARIZONA CONVULVACEAE

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ABSTRACT

Specimens examined in 14 herbaria indicate that there are 30 native and naturalized species of Convolvulaceae in the state of Arizona. Types and select specimens are cited. Notes are given on county distributions, habitats, altitudes, and flowering dates. Comments are made on taxonomic problems, abundance and natural history of selected taxa. A lectotype for *Ipomoea heterophylla* Ortega is selected.

RESUMEN

Una revisión de las muestras de 14 herbarios indica que existen 30 especies nativas y naturalizadas para el estado de Arizona. Se citan los tipos y los ejemplares estudiados. Se nota la distribución por los condados, el hábitat, la distribución altitudinal, y las fechas de floración. Se comenta sobre los problemas taxonómicos, la historia natural, y la abundancia de los taxa. Se selecciona un lectotipo para *Ipomoea heterophylla* Ortega.

During preparation of the family Convolvulaceae for the *Vascular Plants of Arizona*, certain taxonomic notes were found necessary (Austin 1990). The following annotated checklist, which includes all correct names of species known for the state, provides notes on several aspects of systematics, abundance and natural history of Arizonan morning glories. In some cases notes are given on the living colors of floral parts since these details are normally not part of floristic surveys. Included are the corresponding names from Kearney and Peebles (1951) and Kearney et al. (1960) and some additional synonyms. Where types have not been seen, the usage is based on other authors who have seen authentic material, except in a few cases where it is based on the protologue.

1. CALYSTEGIA

1. *CALYSTEGIA LONGIPES* (S. Watson) Brummitt, Ann. Missouri Bot. Gard. 52:215. 1965. — TYPE: NEVADA: in 1872, *Wheeler s.n.* (US!). *Convolvulus longipes* S. Watson, Amer. Naturalist 7:302. 1873.

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Convolvulus linearilobus Eastw., Proc. Calif. Acad. Sci. Ser. 4, 20:470. 1931. — TYPE: ARIZONA: Mazatzal Mts., Eastwood 17264 (CAS!; photo of K specimen at NY!).

Known from Coconino, Gila, Maricopa, Mohave and Yavapai cos. The species grows in chaparral although it has been found extending into the Upper Sonoran zone; 609–1706 m; flowering March to October.

This rare species, having been collected few times since the 1930s and 1940s, is endemic to the Southwest, from California (San Diego Co. to Inyo Co. and from Kern Co. to San Luis Obispo Co.), s Nevada (Clark Co.), Utah (Washington Co.) and Arizona. The species appears to be rare throughout its range.

Corollas are white with a cream-colored throat, and have pink patches on the limb around the nectar guides (interplacae). Styles, androecia and gynoecia are white, but the nectary is yellow. Flowers are pollinated by *Osmia* sp. (Megachilidae).

2. *CALYSTEGIA SEPIUM* (L.) R. Br. ssp. *ANGULATA* Brummitt, Kew Bull. 35(2):328. 1980. — TYPE: IDAHO. CANYON CO.: *Macbride 318* (NY!). *Calystegia sepium* (L.) R. Br. var. *angulata* (Brummitt) N. Holmgren in A. Cronquist et al., Intermountain Fl. Vasc. Pl. Intermountain West, U.S.A. 4:77. 1984.

Known from a single specimen collected in 1882 from a garden in Cochise Co.; ca 1524 m; flowering in June.

These plants are easily confused with the Great Plains taxon *C. sylvatica* (Kit.) Griseb. ssp. *fraterniflora* (Mackenzie and Bush) Brummitt as shown by the interpretations in Tryon (1939), Correll and Correll (1972) and Lehr (1978). The quadrate sinuses in the leaf bases of *C. sylvatica* allow separation from the V-shaped or U-shaped sinuses of *C. sepium*.

3. *CALYSTEGIA MACOUNII* (Greene) Brummitt, Ann. Missouri Bot. Gard. 52:215. 1965. — TYPE: CANADA. SASKATCHEWAN: Assiniboia, Milk River, Aug 1905, *Macoun 11883* (not seen). *Convolvulus macounii* Greene, Pittonia 3:326. 1898.

Convolvulus sepium sensu Kearney and Peebles.

Convolvulus interior House, Bull. Torrey Bot. Club 32:140. 1905. — TYPE: COLORADO: near Fort Collins, *Crandall 1625* (NY!, US!).

Known from Apache, Coconino, Navajo and Yavapai cos. Growing in moist sites, near lakes and streams; 1950–2042 m; flowering June to July.

This rare species is a Great Plains endemic that had not been collected in Arizona since 1971 until it was relocated in 1990 (*Austin & Austin 7661*, ASU).

Corollas, stamens and gynoecia are white, although the nectary is yellow. Bees (not yet determined) visit the flowers.

2. CONVULVULUS

1. CONVULVULUS ARVENSIS Linnaeus, Sp. Pl. 153. 1753. — TYPE: SWEDEN: specimen 218.1 (LINN, microfiche!).

This introduced European weed was first collected in Arizona in 1843 near the Navajo Ordinance Depot in Flagstaff by Lt. P. Shallert, an army surgeon. A short time later, in 1882, Lemmon collected it in the Huachuca Mountains near Ft. Huachuca. The species is now known from all Arizona counties except La Paz. A collection from Greenlee Co. (*Austin & Austin* 7634, ASU) is a new county record. Common in disturbed sites, roadsides, and cultivated fields; 341 – 2346 m; flowering April to October. Common name: "BINDWEED."

2. CONVULVULUS EQUITANS Benth., Pl. Hartweg. 16. 1839. — TYPE: MEXICO: 1837, *Hartweg* 98 (presumably K).

C. incanus sensu auctt., non Vahl.

Known from all Arizona counties except Yuma and La Paz. Frequent in grasslands and plains; 762 – 1981 m; flowering March to November. Local common names are: "SILVER BINDWEED" (*Little* 37, ARIZ), and "DESERT BINDWEED" (*Wilcox s.n.*, ARIZ).

The filaments are white, the anthers purple. Styles and the bases of the stigma lobes are white, but the tips of stigma lobes are purple. The nectary is yellow and cup-shaped. Visited by honeybees (*Apis mellifera*) and bumblebees (*Bombus* sp.) (Pima Co., *Austin & Austin* 7561, ASU).

3. CRESSA

1. CRESSA TRUXILLENSIS H.B.K., Nov. Gen. Sp. Pl. 3:93. 1819. — TYPE: PERU: Trujillo, *Humboldt & Bonpland* 3727 (B: microfiche!, ISOTYPE: F!).

C. depressa Goodd., Bot. Gaz. 37:58. 1904. — TYPE: NEVADA: *Goodding* 726 (UC!).

C. insularis House, Bull. Torrey Bot. Club 33:315. 1906. — TYPE: MEXICO: Revillagigedo Isls, *Barkelew* 252 (US!, UC!).

C. erecta Rydb., Bull. Torrey Bot. Club 40:466. 1913. — TYPE: UTAH: *Garrett* 870 (NY!).

C. minima Heller, *Muhlenbergia* 8:140. 1913. — TYPE: NEVADA: *Heller & Kennedy* 8663a (NY!). *C. truxillensis* H.B.K. var. *minima* (Heller) Munz, *Aliso* 4:96. 1958.

C. pumila Heller, *Muhlenbergia* 8:142. tab. 17. 1913. nomen nudum.

C. vallicola Heller, *Muhlenbergia* 8:140. tab. 17. 1913. — TYPE: CALIFORNIA: *Heller* 8936a UC!). *C. truxillensis* H.B.K. var. *vallicola* (Heller) Munz, *Aliso* 4:96. 1958.

C. cretica L. var. *truxillensis* (H.B.K.) Choisy in DeCandolle, *Prodr.* 9:440. 1845.

Known from Coconino, Maricopa, Mohave, Navajo, Pinal and Yuma cos. Occasional in saline desert; 30 – 1524 m; flowering May to November.

Plants were last collected in Mohave Co. in 1912 (*Jepson 5026*, ARIZ); in Pinal Co. in 1937 (*Peebles 13233*, ARIZ); in Maricopa Co. in 1964 (*Rea s.n.*, ASU); and in Navajo Co. in 1978 (*Pinkava et al. 13839* ASU). Although last collected in Yuma Co. in 1971 (*Hamilton s.n.*, ARIZ, ASU, DES), the plants were relocated in 1989 (*Austin & Austin 7586*, ASU).

Previously the plants had been separated into species or varieties on the basis of growing erect or prostrate. Both growth forms were growing side by side in Yuma. Plants were not found in flower.

4. *DICHONDRA*

1. *DICHONDRA ARGENTEA* Willd., Hort. Berol. 297. t. 81. 1806. — TYPE: COLOMBIA: Tolima ca. Honda, *Bonpland* (B?).

Known from a single collection from Bisbee in Cochise Co. in 1931 (*Harrison 8256*, ARIZ). In New Mexico the plants grow in Chihuahuan desert scrub and Madrean oak woodlands; ca. 1615 m; flowering in September, earlier in New Mexico and Mexico.

The species is frequent in Texas and New Mexico as far west as the Organ Mts. Perhaps the Arizona collection represented a western limit to the natural range of the species, or perhaps it was introduced into Bisbee during the mining operations. Plants have not been relocated in Arizona even though several people have searched for them.

2. *DICHONDRA BRACHYPODA* Wooton & Standley, Contr. U.S. Natl. Herb. 16:160. 1913. — TYPE: NEW MEXICO. DOÑA ANA CO.: Organ Mountains, Filmore Canyon, 23 Sep 1906, *Wooton & Standley s.n.* (US!).

Known from Cochise and Santa Cruz cos. Occasional in Madrean oak woodlands and lower ponderosa pine zones; 1219–1889 m; flowering July to October.

Although the morphological traits given by Tharp & Johnston (1961) are sufficient to distinguish species, they also differ by colors of flower parts. The corolla lobes are cream, green at base. Filaments and stigmas are green. Anthers are white with a purple stripe and the nectary is dark green. The ovary is light green and the styles are cream. Mature fruits collected on 9 Sep 1989 (Cochise Co. Rucker Canyon. *Austin & Austin 7611*, ASU). Fruits were fully mature by October.

3. *DICHONDRA SERICEA* Swartz, Prodr. Veg. Ind. Occ. 54. 1788. — TYPE: JAMAICA: *Swartz* (S?). *D. repens* Forster & Forster var. *sericea* (Swartz) Choisy in DeCandolle, Prodr. 9:451. 1845.

D. repens sensu auct., non Forster & Forster.

In Arizona the species is known exclusively from the Pajarito Mts. in

Santa Cruz Co. Rare in streamside vegetation; ca. 1112 m; flowering May to December.

The single Arizona location is Sycamore Canyon (Santa Cruz Co. from 1936, *Goodding* 6620 ARIZ to 1962, *Barr* 62-863 ARIZ) near the Mexican border. This population was relocated after an hiatus of 19 years (*Austin & Austin* 7604, ASU), but its size has apparently declined. Based on herbarium specimens flowers and fruits are uncommon in this population. Flowers were found in April. Petals, anthers and gynoecia are pale green (*Austin & Austin* 7604, ASU). No flower visitors were seen.

5. *EVOLVULUS*

1. *EVOLVULUS ALSINOIDES* L. var. *ANGUSTIFOLIA* Torrey, Bot. Mex. Bound. 150. 1858. — TYPE: TEXAS. PRESIDIO CO.: ca. the "Grand Canyon" of the Rio Grande. August, *Parry* (not found in CM, GH, ISC, MO, NY, PH, US or YU).

E. alsinoides L. var. *acapulcensis* (Willd.) Ooststr., Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 14:34. 1934. — TYPE: MEXICO. GUERRERO: ca. Acapulco, *Willdenow* 6128 (B).

Known from Cochise, Pima, Pinal and Santa Cruz cos., and reportedly in Gila and Maricopa (Kearney and Peebles 1951, 1960). Occasional in pine-oak woodlands, saguaro desert scrub, and desert grasslands; 762 – 1828 m; flowering February to October. The common name: "DIO DE VIBORA" (Lehr 1978) must represent an error in spelling, or an orthographic variant either of "TIO DE VIBORA" or "DIOS DE VIBORA," although I have found neither of these common names to be in use.

Flowers open 8:00-9:00 a.m., and close ca. 4:00-5:00 p.m. (Pima Co., *Austin & Austin* 7598, ASU). Corollas are blue on the limb, white in the throat. Stamens and gynoecia are white. No flower visitors were seen.

2. *EVOLVULUS ARIZONICUS* A. Gray, Syn. Fl. N. Amer. 2, 1:218. 1878. — TYPE: MEXICO: SONORA: sandy prairies, Sep 1857, *Thurber* 1023 (GH!). See Austin (1990) on complexities of typification.

Evolvulus laetus A. Gray, Proc. Amer. Acad. Arts 17:228. 1882. — TYPE: ARIZONA: 1881, *Pringle s.n.* (F!, GH!, US!). *E. arizonicus* A. Gray var. *laetus* (A. Gray) Ooststr., Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 14:76. 1934.

Known from Cochise, Gila, Graham, Greenlee, Mohave, Navajo, Pinal, Pima, Santa Cruz and Yavapai cos. Occasional to frequent in different parts of the state; more common in the southern counties. Plants grow in chapparal, Madrean oak woodlands, and mesquite grasslands; 883 – 1828 m; flowering April to October. Common name: "FALSE FLAX" (*McGinnies* 4, ARIZ).

Flowers, which open 7:00-8:00 a.m. and close 3:00-4:00 p.m., have

blue limbs, white throats, and white stamens and gynoecia, and are visited by bees (not caught but possibly Halictidae). Pollen was gone and some of the anthers were stripped from flowers by 11:30 a.m. (*Austin & Austin* 7588, ASU).

3. *EVOLVULUS NUTTALLIANUS* Roem. & Schult., Syst. Veg. 6:198. 1820. — TYPE: on the banks of the Missouri, *Nuttall* (B?).

E. pilosus Nutt., Gen. N. Amer. Pl. 1:174. 1818, nom. superfl. — TYPE: on the banks of the Missouri, *Nuttall* (B?).

E. oreophilus Greene, Leaf. Bot. Observ. Crit. 1:151. 1905. — TYPE: NEW MEXICO: *Metcalf* 1228 (NMC, NY!, UC!, US!).

Known from Apache, Cochise, Coconino, Gila, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz and Yavapai cos. Occasional in chaparral, Madrean oak woodlands, ponderosa pine zone, pinon-juniper zone, and rocky grasslands; 822–2438 m; flowering April to September.

Some herbarium specimens are difficult to separate from *E. sericeus*. The species usually may be separated by the spreading-villose trichomes on the sepals of *E. nuttallianus* (Santa Cruz Co., *Austin & Austin* 7572, ASU) and appressed-pilose trichomes on *E. sericeus* although there are intermediate specimens (*Metcalf* 1228, NMC, NY, US).

Corolla limbs are pale blue changing to white near the base; the short tube is pale yellow within. Androecia and gynoecia are white. No insect visitors were seen.

4. *EVOLVULUS SERICEUS* Swartz, Prodr. Veg. Ind. Occ. 55. 1788. — TYPE: JAMAICA: *Swartz* (M, S).

E. wilcoxianus House, Bull. Torrey Bot. Club 33:315. 1906. — TYPE: ARIZONA: *Wilcox* 96 (US!).

Known from Cochise, Gila, Graham, Greenlee, Pima, Pinal, Navajo, Santa Cruz and Yavapai cos. Frequent in chaparral, Madrean oak woodlands, and desert grasslands; 975–1889 m; flowering May to October.

For those wishing to recognize them, two varieties have been named: var. *discolor* (Benth.) A. Gray, with upper leaf surface glabrous and var. *sericeus*, with leaves sericeous on both surfaces. Since these plants may be found growing together outside the U.S.A., I do not recognize the distinction.

Specimens that were separated as *E. oreophilus* Greene were treated by Ooststroom (1934) as *E. sericeus* var. *discolor* form B. These are better treated as *E. nuttallianus* because of their habit, corolla shape and color and indumentum on both leaf surfaces.

The androecium and the gynoecium are white (Cochise Co. *Austin & Austin* 7571, ASU). No flower visitors have been seen.

6. *IPOMOEA*

1. *IPOMOEA BARBATISEPALA* A. Gray, Syn. Fl. N. Amer. 2, 1:212. 1886.
— TYPE: TEXAS: *Wright 507* (GH!, US!).

Known from Cochise, Gila, Graham, Greenlee, Maricopa, Pima, Santa Cruz, and Yavapai cos. Occasional in mesquite grasslands and Madrean oak woodlands; 853–2438 m; flowering July to December.

Flowers open at dawn, and are at first blue on the limb with a white throat. The outside of the tube is white on the folds (plicae) and pale green on the unfolded area (interplicae). As senescence beings, the corolla turns pink and then reddish. Anthers are white, but the filaments are pale yellow. The style is green, the stigma white and 2-lobed, the ovary green, and the disc yellow and cup-shaped (Pima Co., *Austin & Austin 7594*, ASU).

2. *IPOMOEA CAPILLACEA* (H.B.K.) G. Don, Gen. Syst. 4:267. 1838.
— TYPE: COLOMBIA: *Bonpland* (microfiche!).

I. muricata Cav., Icones Pl. 5:52. pl. 478. f. 2. 1794, non L. (1763), non Jacq. (1789).

Known from Cochise, Coconino, Pima, Santa Cruz and Yavapai cos. Occasional in Madrean oak woodlands, desert grasslands, and ponderosa pine zones; 1524–2499 m; flowering July to September.

Flowers open at dawn. The corolla limb is lavender and the tube white, within and without. Androecia and gynoecia are also white. Beeflies (Bombyliidae) visit the flowers (Cochise Co., *Austin & Austin 7569*, ASU).

3. *IPOMOEA CARDIOPHYLLA* A. Gray, Syn. Fl. N. Amer. 2, 1:213. 1886.
— TYPE: TEXAS: *Wright 511* (GH!).

No Arizona specimens were seen by Kearney and Peebles (1951, 1960) although they suggested this species' presence in Arizona as probable. A population was reported near Tombstone by Mason et al. (1986) and was relocated in 1989 (Cochise Co., *Austin & Austin 7608*, ASU). The species is represented by scattered plants extending along the road for about 0.8 miles at an altitude of 1127 m in mesquite-creosote bush scrub (Chihuahuan desert scrub sensu Brown and Lowe 1980). No fruits were present on 7 Sep 1989; some mature fruits were found on 26 Sep, but were heavily parasitized by insects. Rare and local.

Flowers open at 6 a.m.; mostly wilted by 11 a.m. The corolla tube is pale yellow on the outside; the limb is pale blue (as in *I. tricolor*). Stamens are white to pale cream; the style is green, the stigma white. No odor was detectable, and no insects visited between 6:00 and 6:30 a.m. McDonald (1982) found no pollinators on the species in Texas and New Mexico and

had a 90% seed set on cultivated plants. The species may be considered autogamous.

4. *IPOMOEA COSTELLATA* Torr., Bot. Mex. Bound. 149. 1859. — TYPE: TEXAS: *Wright 505* (GH!, US!).

I. futilis A. Nelson, Univ. Wyoming Publ. Sci. 1(3):65. 1924. — TYPE: ARIZONA: *Hanson 1016* (RS, not seen; photo FAU!).

Known from Apache, Cochise, Coconino, Gila, Greenlee, Mohave, Navajo, Pima, Pinal, Santa Cruz and Yavapai cos. Common in chaparral, Madrean oak woodlands, and ponderosa pine zones; 975 – 2133 m; flowering July to October.

Flowers begin to open at 8:15 a.m. and begin to wilt at 10:30 a.m. The corolla limb is lavender, the tube white within and without. Filaments and anthers are white; white trichomes extend along the filaments from base to apex; the ovary is cream, and the style is green. A stigma was 3-lobed on one flower, 2-lobed on others. The flowers are visited by bumblebees (Cochise Co. *Austin & Austin 7584*, ASU).

5. *IPOMOEA CRISTULATA* H. Hallier, Med. Rijksherb. Leiden 46:20. 1922. A new name for *Quamoclit gracilis* H. Hallier. — TYPE: MEXICO: based on syntypes including *Bourgeau 1061* (G-DC!). *Quamoclit gracilis* H. Hallier, Bull. Herb. Boiss. 7:416. 1899.

I. coccinea auctt., non L.

Known from all Arizona counties except La Paz. Plants grow in chaparral, Madrean oak woodlands, and ponderosa pine zones; 731 – 2773 m; flowering May to November. This is probably the most common and widespread species in the state. "STAR GLORY" (*Blakeley & Marshall 568*, DES)

Flowers, which are open from 6:00 a.m. into the late afternoon, are visited by hummingbirds. Since the stigma is held below the level of stamens, the plants may be facultatively allogamous (Pima Co., *Austin & Austin 7593*, ASU). According to an anonymous reviewer the species is probably predominantly selfing and there may be cleistogamous flowers under low light conditions. Even when chasmogamous the anthers dehisce before anthesis.

7. *IPOMOEA HEDERACEA* Jacq., Collect. Bot. 1:124. 1786. — TYPE: based on Dillenius, Hort. Elth. t. 80, fig. 92 (plate selected lectotype! by Verdcourt, 1957).

I. desertorum House, Ann. New York Acad. Sci. 18:203. 1908. — TYPE: ARIZONA: *Thorber 29* (ARIZ!, NY!).

Although not reported for Arizona by Kearney and Peebles (1951,

1960), certain specimens identified as "*I. hirsutula*" are of this species, the others are *I. purpurea* (Austin, 1990).

Known from Cochise, Coconino, Gila, Graham, Maricopa, Pima, Pinal, Santa Cruz, Yavapai and Yuma cos. Common in various disturbed sites, especially cotton fields; 883–1859 m; flowering August to November.

The corollas open at dawn, some closing by 8:15 a.m., and all are closed by 11 a.m. Honeybees were seen bypassing flowers after pausing. A bumblebee bypassed flowers of *I. hederacea* but visited those of *I. costellata* and *Convolvulus equitans*. However, flowers of *I. hederacea* were visited by short-tailed black swallowtail butterflies (*Papilio indra*). Corolla limbs are blue early after opening but begin to include reddish pigments as they begin to wilt and turn more purple. The corolla tube is white within and without. The stamens and the styles are white; the ovary is cream (Pima Co., *Austin & Austin 7596*, ASU).

8. *IPOMOEA LEPTOTOMA* Torr., Bot. Mex. Bound. 150. 1859. — TYPE: MEXICO. SONORA: *Thurber 977* (GH!).

I. leptotoma var. *wootonii* E. Kelso, Rhodora 39:151. 1937. — TYPE: ARIZONA: 10 Sep 1914, *Wooton 10* (US!). *I. leptotoma* Torr. f. *wootonii* (E. Kelso) Wiggins, Contr. Dudley Herb. 4:21. 1950.

Known from Cochise, Gila, Graham, Pima, Pinal, Santa Cruz and Yavapai cos. Occasional in plains, Sonoran desert scrub; 609–1371 m; flowering June to October.

The corolla opens as the sun rays touch it, between 7:30 and 8:00 a.m., and close between 10:30 and 11:00 a.m. Corolla limbs are lavender, and there is a white zone between the limb and pale yellow base of the tube. The tube is white without. Orange trichomes adorn filaments from base to apex; the androecium, gynoecium, style, ovary, and disc are white. Skippers (Hesperiidae) visit flowers (Gila Co., *Austin & Austin 7601*, ASU, which is a new county record; Pima Co. *Austin & Austin 7595*, ASU).

9. *IPOMOEA* × *LEUCANTHA* Jacquin, Icones Rar. 2:t. 318. 1788. — TYPE: no specimen known; illustration chosen as lectotype by Austin in 1978.

I. triloba sensu auctr., non L. (1753).

I. lacunosa sensu Shinnars (1965), non L. (1753).

Known from Maricopa, Pima and Yuma cos. Plants grow in disturbed sites; ca. 701 m; flowering March to November.

Known from three old collections (Santa Cruz Co., *Pringle* in 1884, ARIZ; Pima Co., *Thornber* in 1912, ARIZ; county unknown, *LeRoy s.n.*, NY); one in 1945 (Pima Co. *Goodding & Lusher 128-45*, NY), and two recent ones (Maricopa Co. 4 Oct 1979, *Heathman s.n.*, ARIZ, ASU; Yuma

Co. 7 Nov 1985, *Tuttle s.n.*, ARIZ). The hybrids are probably not as rare as collections seem to indicate since they are weeds in cotton fields.

10. *IPOMOEA LINDHEIMERI* A. Gray, Syn. Fl. N. Amer. 2, 1:210. 1886.
— TYPE: TEXAS: *Wright 508* (GH!, US!).

Known from Cochise Co. (Gleeson, 25 Aug 1927, *Thornber s.n.*, ARIZ; Bisbee, 30 Sep. 1930, *Thornber s.n.*, ARIZ); reportedly from Pima Co. (Kearney and Peebles 1951; Kearney et al. 1960). Plants grow in Madrean oak woodlands, and Chihuahuan desert scrub zones; 1066–1371 m; flowering August to September.

An extremely rare species; its continued existence in Arizona is problematical. Probably related to and easily confused with *I. pubescens* Lam., the two collections from Arizona are somewhat intermediate between the two on the basis of sepal shape and pubescence.

11. *IPOMOEA LONGIFOLIA* Benth., Pl. Hartweg. 16. 1839. — TYPE: MEXICO: *Hartweg* (K).

Known from Cochise and Santa Cruz cos. Locally common in Madrean oak woodlands; 975–1828 m; flowering July to September.

The nectary is cream-colored, and the androecium and gynoecium are white. Early in the evening the flowers have a slight sweet fragrance. Flowers are pollinated by moths (Austin 1986). Flowers open 3:00 to 4:00 p.m. and close near dawn; a few were still open at 7:30 a.m. (Cochise Co., *Austin & Austin 7582*, ASU).

12. *IPOMOEA PLUMMERAE* A. Gray, Syn. Fl. N. Amer. 2, 1:suppl. 434. 1886. — TYPE: ARIZONA: *Leemmon 2839* (GH!).

I. cuneifolia A. Gray, Proc. Amer. Acad. Arts 19:90. 1883, non Meisner (1869). — TYPE: ARIZONA: *Leemmon 2839* (F!, GH!, US!).

I. egregia House, Torreya 6:124. 1906, nom. nov. for *I. cuneifolia* A. Gray.

Known from Apache, Cochise, Coconino, Gila, Graham, Greenlee, Pima, Santa Cruz and Yavapai cos. Occasional in the ponderosa pine zone; 1219–2743 m; flowering April to October.

The corollas open by ca. 6:30 a.m., are closing at 10:30 a.m. and are completely closed at 11:50 a.m. Corolla limbs are lavender, the tube white within and without. The ovary and style are green, the stigma and stamens white (Cochise Co., *Austin & Austin 7581*, ASU).

13. *IPOMOEA PUBESCENS* Lam., Encycl. Meth. Bot. 1:265. 1791. — TYPE: AMERICA: collector unknown (K!).

I. heterophylla Ortega, Nov. Pl. Descr. Dec. 1:9. 1797. — TYPE: MEXICO: Horto Regio., 1797, *Ortega* (LECTOTYPE: MA 222592, photo FAU!).

The curator of the herbarium in Madrid sent me photographs of six specimens of *Ipomoea heterophylla* in their collection. One of these was collected in Peru (MA 222596) and will not serve as a lectotype because the protologue cites only Cuba and Mexico. Two other sheets (MA 222595, 222597) are labeled with the dates 1798 and 1801, respectively. These will not serve as lectotypes because they are dated after the publication by Ortega. Two of the remaining sheets (MA 222593, 222594) were labeled by J.D. Rodrigues, and are excluded because they are incomplete in comparison to the last collection which carries Ortega's name. Therefore, the specimen with Ortega's name as collector is chosen as lectotype.

1. *lindheimeri* A. Gray var. *subintegra* House, Ann. New York Acad. Sci. 18:196. 1908. — TYPE: ARIZONA: *Lemmon* 2835 (GH!).

Known from Cochise and Santa Cruz cos. Growing in canyons; 106–1371 m; flowering August to September.

This is now an extremely rare plant in Arizona. Of the seven sites where it was formerly collected, plants were relocated in only one (Santa Cruz Co., *Austin & Austin* 7605, ASU). The plants are not common in adjacent Mexico and should be considered endangered in the state of Arizona. Plants in Texas, New Mexico and Arizona have flowers considerably larger than the populations in Meso-America and South America. Perhaps more than one taxon is involved.

Flowers begin to close at 9:40 a.m., and all are closed by 10:15 a.m. Corolla limbs are lavender, and the tubes are white within and without. Styles, stigmas and stamens are white.

14. *IPOMOEA PURPUREA* (L.) Roth, Bot. Abh. 27. 1787. — TYPE: U.S.A.: Dillenius, Hort. Elth. t. 84, fig. 97. 1732 (chosen lectotype! by Verdcourt, 1963).

1. *hirtutula* Jacq. f., Ecol. Pl. Rar. 1:63. t. 44. 1811. — TYPE: no specimen found, the plate chosen as lectotype by Ausrin (1990).

Known from Apache, Cochise, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Santa Cruz and Yavapai cos. Found in cultivated fields and other disturbed sites; 304–2286 m; flowering July to November. Occasional to common in counties bordering Mexico.

Flowers in cultivated plants have variable corolla colors, but the wild populations are consistently purple on the limb, with pink nectar guides (plicae), and tubes which are white within and without. In wild plants, the ovary is green, and the androecium, style and stigma are white; in cultivated plants, the ovary is cream, the style white. Flowers (wild plants) are visited by sulphur butterflies (Cochise Co., *Austin & Austin* 7614, ASU).

15. *IPOMOEA TENUILOBA* Torr., Bot. Mex. Bound. 148. 1859. — TYPE: TEXAS: *Bigelow* (US!).

1. *lemmoni* A. Gray, Proc. Amer. Acad. Arts 19:20. 1883. — TYPE: ARIZONA: *Lemmon* 2840 (GH!, US!). 1. *tenuiloba* Torr. var. *lemmonii* (A. Gray) Yarskiyevych & Mason, Madroño 31:102. 1984.

Known from Cochise, Pima and Santa Cruz cos. Plants grow in chaparral, Madrean oak woodlands, and ponderosa pine zones; 1280–1920 m; flowering August to September.

A rare species that should be considered threatened in Arizona. Two varieties exist (Yatskievych and Mason 1984): *I. tenuiloba* var. *tenuiloba* has white flowers; *I. tenuiloba* var. *lemmoni* (A. Gray) Yatskievych and Mason has purple flowers.

Flowers of var. *lemmoni* open before daylight between 1:00 and 5:00 a. m. and close between 7:00 and 8:00 a. m. Corolla limbs are pale lavender and the tube is white within and without. Stamens and stigmas are white. Although the morphology of the flowers indicates adaptation for moth pollination, no moth scales on the stigmas or other evidence of visitation was found. The flowers had no fragrance. Perhaps the plants in Arizona, being on the northern fringe of the range, are autogamous.

Plants had been in flower for 10 days by 29 Aug 1989, and fruits were about half grown on a few plants. About 30 flowers were found in the population on 29 Aug; 24 flowers on 30 Aug. The population was rechecked in Bear Canyon 14 Sep and was still alive but no longer in flower (Pima Co., Bear Canyon, *Austin & Austin* 7592, ASU).

Plants grow in the *Pinus-Juniperus-Quercus* zone in Santa Catalina Mts. and Huachuca Mts. Found on quartzite in the Huachuca Mts. (Santa Cruz Co., *Austin & Austin* 7618, ASU). This substrate is the only one where the species occurs in the Huachuca Mts. (E Reichenbacher, pers. comm., 1989).

16. *IPOMOEA THURBERI* A. Gray, Syn. Fl. N. Amer. 2, 1:212. 1886.

— TYPE: ARIZONA: *Thurber* 966 (HOLOTYPE: GH!).

I. gentryi Standley, Field Mus. Nat. Hist. 22:46. 1940. — TYPE: MEXICO. CHIHUAHUA: Río Mayo, Sierra Canelo. 30 Aug 1936, *Gentry* 2497 (HOLOTYPE: F!).

Known from Cochise, Pima and Santa Cruz cos. Grows in Madrean oak woodlands, near lakes; 1158–1524 m; flowering July to September.

For some time the species was thought to be endemic to the United States. Although not included under *I. thurberi* for Mexico by Matuda (1963–1965), he did include it from Chihuahua, Durango and Sonora under *I. gentryi*.

MEXICO. SONORA: vic. El Llano, ca. 9.5 mi W of San Felipe, Sierra Los Locos, 11–12 Aug 1980, *Hole & Martin* s.n. (ARIZ).

Kearney and Peebles (1951) wrote that the plants had “purple flowers opening in the evening.” In fact, the flowers have a pink limb and green throat; they wilt and dry with a green tube and purple limb. Flowers, opening near 6:30 p.m., are visited by sphinx moths (probably *Hyles*

lineata). All flowers examined had moth scales on the stigmas, further indicating moth pollination. Gynoecia and androecia are white. Only 30–50 plants comprise the population (Santa Cruz Co., *Austin & Austin* 7603, ASU). The species is rare in Arizona and in Mexico (J. A. McDonald, personal communication, Nov. 1989), and should be placed on Arizona's endangered list.

Tentatively placed in *Ipomoea* section *Tyrianthinae* by McDonald (1987), the species does not belong to that section because it has three carpels. The species belongs to *Ipomoea* section *Pharbitis* where it was originally placed by A. Gray.

7. JACQUEMONTIA

1. JACQUEMONTIA AGRESTIS (Choisy) Meisn. in Mart., Fl. Bras. 7:306. 1869. — TYPE: BRAZIL: *Martius* (M!, photo MO!). *Convolvulus agrestis* Choisy in DC., Prodr. 9:405. 1845.

J. palmeri S. Watson, Proc. Amer. Acad. Arts 24:63. 1889. — TYPE: MEXICO: Guaymas, *Brandege* s.n. (GH!, NY!, US!).

In Arizona, known only from Pima Co. Plants probably grow in semidesert grassland; ca. 1219 m; flowering August to October.

This species was collected in the Baboquivari Mts. several times between the 1920s and 1940s, but it has not been collected since. Although the species is associated with cultivated land in many places in Mexico, its current status in Arizona is uncertain. It may have been brought into the state from Mexico as a weed with plants cultivated by the Tohono O'odham. In Mexico and elsewhere the species is commonly a weed in maize fields and other cultivated crops.

2. JACQUEMONTIA PRINGLEI A. Gray, Proc. Amer. Acad. Arts 17: 228. 1882. — TYPE: ARIZONA: *Pringle* 295 (GH!).

J. pringlei var. *glabrescens* A. Gray, Proc. Amer. Acad. Arts 21:402. 1886. — TYPE: MEXICO: *Palmer* 107 (GH! chosen lectotype by Robertson (1971), but not published; his choice here upheld).

Known from Pima, Pinal, Yuma and doubtfully recorded Cochise Co. Frequent in saguaro desert scrub; 914–1371 m; flowering April to October.

There is a specimen supposedly collected in the Chiricahua Mts. (Cochise Co. Chiricahua Mountains, 20 Jul 1895, *Toumey* s.n. NY!, US!). Since no one else has located the species in this mountain range, nor in the nearby ranges, the specimen probably was incorrectly labeled. The plants are Sonoran Desert endemics ranging from Pima Co., Arizona, south to Los Mochis, Sinaloa, Mexico (Robertson 1971).

Flowers, which are white throughout, open at dawn, as the sun strikes them, and close between 3:00-4:00 p.m. Pollination is by the bee *Duforea* sp. (Halictidae) which drinks nectar but does not actively collect pollen. Numerous bees visit the flowers regularly. Later in the season, fruit set is high, with most flowers producing some seed (Pima Co., *Austin & Austin 7591*, ASU).

The following species are now or have been in cultivation in Arizona: *Convolvulus cneorum* L. (Morning Glory, Bush Morning Glory), *Convolvulus tricolor* L. (Morning Glory), *Convolvulus sabatius* Viviani var. *mauritanicus* (Boiss.) Sa'ad (Morocco Glorybind, Ground Morning Glory), *Dichondra micrantha* Urban (Pennywort), *Ipomoea batatas* (L.) Lam. (Sweet Potato, Batata, Camote), *Ipomoea carnea* Jacq. ssp. *fistulosa* (Choisy) D. Austin (Tree Morning Glory, Bush Morning Glory), *Ipomoea tricolor* Cav. (Morning Glory, Heavenly Blue), and *Merremia dissecta* (Jacq.) H. Hallier (Alamo vine, Mile-a-minute vine).

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